



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

Address: COMMISSIONER FOR PATENTS

P.O. Box 1450

Alexandria, Virginia 22313-1450

www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/511,186	08/02/2005	Hiroyuki Ito	09792909-6005	1846
26263 7590 02/10/2009 SONNENSCHN NATH & ROSENTHAL LLP P.O. BOX 061080 WACKER DRIVE STATION, SEARS TOWER CHICAGO, IL 60606-1080				
EXAMINER				
GREEN, TRACIE Y				
ART UNIT		PAPER NUMBER		
2879				
MAIL DATE		DELIVERY MODE		
02/10/2009		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/511,186

Applicant(s)

ITOU ET AL.

Examiner

TRACIE Y. GREEN

Art Unit

2879

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 January 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SG/US)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 11/26/2008 has been entered.

Response to Amendment

2. Receipt is acknowledged of applicant's amendment filed 11/26/2008. Claims 1-12 are pending and an action on the merits is as follows.
3. Applicant's amendments with respect to claim 1-12 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-5 and 9-12 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Amey, Jr. et al. (US 6,409,567) in view of Debe (US 5,726,524).

Regarding claim 1, Amey, Jr. et al. (Amey, hereafter) teaches a field electron emission film (column 4, lines 60-65) on an electrode substrate, said field electron emission film comprising: an ink (Column 7, lines 30-35) and a carbon nanotube structural body of 0.001 to 40% by weight (Column 7, lines 30-35) and a heat-decomposable metal compound dispersed therein (Column 7, lines 30-35) (*Examiner note : prior art teaches carbon nanotube ink by conventional means disclosed in applicants disclosure. Heat decomposable compound including frit material with metal components*); "wherein, said ink is coated and sintered on said surface of said electron substrate (Column 7, lines 50-55) heat-decomposable metal compound in said ink is decomposed to a heat decomposition product by sintering and said heat decomposition product having an adhesive characteristic (Column 4, lines 35-44 and Column 7, lines 50-55) (*Prior art reveals the firing of the frit seal allows for the electron emission material to stick to adhere to the substrate*) imparted by said sintering

Examiner note: The applicant is claiming the product of field emission film including a method (i.e. a process) of making sintering" consequently, this portion of claim 1 is considered "product-by-process". In spite of the fact that the product-by-process claim may recite only process limitations, it is the product and not the recited process that is covered by the claim. Further, patentability of a claim to a product does not rest merely on the difference in the method by which the product is made. If the product in the product-by-process claim is the same as or obvious from a product of the

prior art, the claim is unpatentable even though the prior art product was made by a different process.

Furthermore, it is well established that a claimed apparatus cannot be distinguished over the prior art by a process limitation. Consequently, absent a showing of an unobvious difference between the claimed product and the prior art, the subject product-by-process claim limitation is not afforded patentable weight (see MPEP 2113).

Amey is silent regarding said field electron film has a surface roughness of 1500nm or less.

In the same field of endeavor of field emission devices, Debe teaches wherein said field electron film has a surface roughness of 1500nm or less (Column 2, lines 65- Column 3, lines 3 and Column 4, lines 15-25) in order to provide a device that gives spatially averaged emission levels which are stochastically uniform from pixel to pixel at lower voltages than the prior art; because of the large number of emitting sites per unit area, lower current densities per emission site are allowed (Column 6, lines 5-11).

Therefore one of ordinary skill in the art at the time of the invention, could modify the field electron device of Amey wherein said field electron film has a surface roughness of 1500nm or less in order to provide a device that gives spatially averaged emission levels which are stochastically uniform from pixel to pixel at lower voltages than the prior art; because of the large number of emitting sites per unit area, lower current densities per emission site are allowed as taught by Debe.

Regarding claim 2, Amey teaches where said heat-decomposable metal compound is an organo-metallic compound (Column 7, lines 10-20).

Regarding Claims 3, Amey teaches wherein said heat-decomposable metal compound is metal salt (Column 7, lines 5-10)

Regarding Claims 4, Amey teaches wherein said heat-decomposable metal compound is an organo-metallic salt compound (Column 7, lines 5-10)

Regarding Claims 5, Amey teaches said heat-decomposable metal compound is metal complex. (Column 7, lines 10-20)

Regarding Claims 9, Amey teaches the thickness of said field electron emission film is 0.05 .mu.m to 20 .mu.m. (Column 8, lines 1-5)

Regarding claim 10, Amey teaches (Figure 16) a field emission electrode of a two pole type comprising: a cathode (2) on said support (3) and a field electron emission film (1) on said cathode (2), wherein said field electron emission film-comprises an ink having of a carbon nanotube structural body of 0.001 to 40% weight (Column 7, lines 30-35) by a heat-decomposable metal compound dispersed therein (Column 7, lines 30-35) said ink is coated and sintered on said surface of said cathode (Column 7, lines 50-55) said heat-decomposable metal compound in said ink is decomposed (Column 7, lines 50-55) to a heat decomposition product by sintering and said heat decomposition product having an adhesive characteristic Column 4, lines 35-44 and Column 7, lines 50-55) imparted by said sintering.

Examiner note: The applicant is claiming the product of field emission film including a method (i.e. a process) of making sintering^{""} consequently, this portion of claim 1 is considered "product-by-process". In spite of the fact that the product-by-

process claim may recite only process limitations, it is the product and not the recited process that is covered by the claim. Further, patentability of a claim to a product does not rest merely on the difference in the method by which the product is made. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior art product was made by a different process.

Furthermore, it is well established that a claimed apparatus cannot be distinguished over the prior art by a process limitation. Consequently, absent a showing of an unobvious difference between the claimed product and the prior art, the subject product-by-process claim limitation is not afforded patentable weight (see MPEP 2113).

Amey is silent regarding said field electron film has a surface roughness of 1500nm or less.

In the same field of endeavor of field emission devices, Debe teaches wherein said field electron film has a surface roughness of 1500nm or less (Column 2, lines 65- Column 3, lines 3 and Column 4, lines 15-25) in order to provide a device that gives spatially averaged emission levels which are stochastically uniform from pixel to pixel at lower voltages than the prior art; because of the large number of emitting sites per unit area, lower current densities per emission site are allowed (Column 6, lines 5-11).

Therefore one of ordinary skill in the art at the time of the invention, could modify the field electron device of Amey wherein said field electron film has a surface roughness of 1500nm or less in order to provide a device that gives spatially averaged emission levels which are stochastically uniform from pixel to pixel at lower voltages

than the prior art; because of the large number of emitting sites per unit area, lower current densities per emission site are allowed as taught by Debe.

Regarding claim 11, Amey teaches (Figure 16) a field electron emission electron of 3-pole type, comprising: a cathode (2), an insulating film (4), and a gate electrode (5) sequentially formed on a support (3); a cathode (2) on said support (3); an insulating film (4) on said cathode (2); a gate electrode (5) on said insulating film (4); an first opening formed in common in the in said gate electrode (5); a second opening in said insulating film (4) and the gate electrode(5) ; said first and second opening overlapping at least in part; and a field electron emission film (1) formed at least on said cathode (2) exposed in the opening, wherein, said field electron emission film comprises an ink having a carbon nanotube structural body of 0.001 to 40% by weight (Column 7, lines 30-35) and a heat-decomposable metal compound dispersed therein weight (Column 7, lines 30-35) said ink is coated and sintered on said surface of said cathode (Column 7, lines 50-55) said heat-decomposable metal compound in said ink is decomposed (Column 7, lines 50-55)to a heat decomposition product by sintering and said heat decomposition product having an adhesive characteristic Column 4, lines 35-44 and Column 7, lines 50-55) imparted by said sintering.

Examiner note: The applicant is claiming the product of field emission film including a method (i.e. a process) of making "sintering" consequently, this portion of claim 1 is considered "product-by-process". In spite of the fact that the product-by-process claim may recite only process limitations, it is the product and not the recited process that is covered by the claim. Further, patentability of a claim to a product does

not rest merely on the difference in the method by which the product is made. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior art product was made by a different process.

Furthermore, it is well established that a claimed apparatus cannot be distinguished over the prior art by a process limitation. Consequently, absent a showing of an unobvious difference between the claimed product and the prior art, the subject product-by-process claim limitation is not afforded patentable weight (see MPEP 2113).

Amey is silent regarding said field electron film has a surface roughness of 1500nm or less.

In the same field of endeavor of field emission devices, Debe teaches wherein said field electron film has a surface roughness of 1500nm or less (Column 2, lines 65- Column 3, lines 3 and Column 4, lines 15-25) in order to provide a device that gives spatially averaged emission levels which are stochastically uniform from pixel to pixel at lower voltages than the prior art; because of the large number of emitting sites per unit area, lower current densities per emission site are allowed (Column 6, lines 5-11).

Therefore one of ordinary skill in the art at the time of the invention, could modify the field electron device of Amey wherein said field electron film has a surface roughness of 1500nm or less in order to provide a device that gives spatially averaged emission levels which are stochastically uniform from pixel to pixel at lower voltages than the prior art; because of the large number of emitting sites per unit area, lower current densities per emission site are allowed as taught by Debe.

Regarding claim 12 Amey teaches field electron emission display device comprising: a cathode panel (2) having a field electron emission electrode (1) disposed thereon; and an anode panel (6) having a fluorescent layer (8) and an anode (7) disposed thereon, the both panels being bonded at the individual circumferential portions thereof, and; a field electron emission film (1) on said cathode panel (2), wherein said field electron emission film (1) comprises an ink having a carbon nanotube structural body of 0.001 to 40% by weight (Column 7, lines 30-35) and a heat-decomposable metal compound dispersed therein (Column 7, lines 30-35)

Amey does not explicitly teach a plurality of emission electrodes nor the anode panel and cathode panel being seal at the circumferential edge. However one of ordinary skill in the art would be able to make a display with a plurality of field emission electrodes in order to render a full color device and to seal the panels together at the edge while applying the teachings of Amey to produce an electron emission film in order to provide a low voltage display with improved electron emission.

Amey teaches said ink is coated and sintered on said surface of said cathode (Column 7, lines 50-55) said heat-decomposable metal compound in said ink is decomposed (Column 7, lines 50-55) to a heat decomposition product by sintering and said heat decomposition product having an adhesive characteristic Column 4, lines 35-44 and Column 7, lines 50-55) imparted by said sintering.

Examiner note: The applicant is claiming the product of field emission film including a method (i.e. a process) of making "sintering" consequently, this portion of claim 1 is considered "product-by-process". In spite of the fact that the product-by-

process claim may recite only process limitations, it is the product and not the recited process that is covered by the claim. Further, patentability of a claim to a product does not rest merely on the difference in the method by which the product is made. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior art product was made by a different process.

Furthermore, it is well established that a claimed apparatus cannot be distinguished over the prior art by a process limitation. Consequently, absent a showing of an unobvious difference between the claimed product and the prior art, the subject product-by-process claim limitation is not afforded patentable weight (see MPEP 2113).

Amey is silent regarding said field electron film has a surface roughness of 1500nm or less.

In the same field of endeavor of field emission devices, Debe teaches wherein said field electron film has a surface roughness of 1500nm or less (Column 2, lines 65- Column 3, lines 3 and Column 4, lines 15-25) in order to provide a device that gives spatially averaged emission levels which are stochastically uniform from pixel to pixel at lower voltages than the prior art; because of the large number of emitting sites per unit area, lower current densities per emission site are allowed (Column 6, lines 5-11).

Therefore one of ordinary skill in the art at the time of the invention, could modify the field electron device of Amey wherein said field electron film has a surface roughness of 1500nm or less in order to provide a device that gives spatially averaged emission levels which are stochastically uniform from pixel to pixel at lower voltages

than the prior art; because of the large number of emitting sites per unit area, lower current densities per emission site are allowed as taught by Debe.

6. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Amey, Jr. et al. (US 6,409,567).in view of Debe (US 5,726,524) as applied to claim 1,10 and 11 and in further view of Saito et al. (US 2002/0031465 A1).

Amey as modified by Debe teaches the field emitter film set forth above (see rejection claim 1). Amey as modified by Debe is silent regarding wherein said heat decomposition product is composed of a plurality of metals.

In the same field of endeavor of field emission devices, Saito teaches wherein; said heat decomposition product is composed of a plurality of metals (Paragraph 51, lines 10-12) in order to provide a device with single-walled carbon nanotubes having a straight shape at high production efficiency (Paragraph 12).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to further modify the field emission film of Amey wherein said heat decomposition product is composed of a plurality of metals in order to provide a device with single-walled carbon nanotubes having a straight shape at a high production efficiency as taught by Saito.

7. Claims 7-8 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Amey, Jr. et al. (US 6,409,567). in view of Debe (US 5,726,524) as applied to claim 1,10 and 11 in view of Saito et al. (US 2002/0031465 A1) as applied to claim 6 and in further view Kajiwara et al. (US 2003/0102797).

Amey as modified by Debe and Saito et al. teaches the field emitter film set forth above (see rejection claim 1 and 6). Amey as modified by Debe and Saito et al. is silent regarding said the film has a plurality of metals are Sn and at least one metal selected from In and Sb (claim 7) and plurality of metals are Sn and In, where ratio of Sn to In is 6 at % or more (claim 8)

In the same field of endeavor field emission devices, Kajiware teaches said plurality of metals are Sn and at least one metal selected from In and Sb (Table 1, row 1) and plurality of metals are Sn and In, where ratio of Sn to In is 6 at % or more (Table 1, row 1) (*Examiner note : the table discloses both tin and indium can be added in various amounts*) in order to provide a device with nanotubes with great adhesion, conductivity, and improved electron emission.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to further modify the field emission film of Amey with the film has a plurality of metals are Sn and at least one metal selected from In and Sb and plurality of metals are Sn and In, where ratio of Sn to In is 6 at % or more in order to provide a device with nanotubes with great adhesion, conductivity, and improved electron emission as taught by Kajiware.

Response to Arguments

Applicant's arguments with respect to claims 1 and 10-12 have been considered but are moot in view of the new ground(s) of rejection.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to TRACIE Y. GREEN whose telephone number is (571)270-3104. The examiner can normally be reached on Monday-Thursday, 7:30 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on 571/272-2457. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

/Tracie Y Green/
Examiner, Art Unit 2879

/Sikha Roy/
Primary Examiner, Art Unit 2879